Totem Ocean Trailer Express

Fleet Renewal...the “Orca Class” Ro/Ro Vessel
TOTE Company History

- Founded in 1975 by Sun Company
- SS Great Land maiden voyage September 1975
- May 1976 TOTE adds second vessel for two sailings per week
- TOTE acquired by Saltchuk in 1982
- July 1991 SS Northern Lights purchased and modified
- Contract with NASSCO for two Orca Class Ro/Ro vessels December 1999
- April 2003-Midnight Sun delivered
- August 2003-North Star delivered
TOTE Alaska Operations

- Niche Ro/Ro liner service characterized by:
  - Speed - 10 hour port turnaround
  - Flexibility - all equipment types
  - Vehicles
- Two sailings per week
- 98% average on-time record over 5 years
- Highway and rail connections throughout greater Alaska and Lower 48/Canada
Alaska Transportation Challenges

• Railbelt Alaska’s freight arrives by:
  – Liner Vessel - 69%
  – Barge - 27%
  – Overland - 4%

• 1,450 nautical miles one way (Tacoma-Anchorage)
  – Wind gust to 100 knots
  – Seas to 60’

• Cook Inlet
  – Ice-choked 5 months of year
  – 6 to 7 knot tidal current
  – 35’ tidal range
## Vessel Comparison

<table>
<thead>
<tr>
<th></th>
<th>Orca</th>
<th>Ponce</th>
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<tbody>
<tr>
<td><strong>Length</strong></td>
<td>839 feet</td>
<td>790 feet</td>
</tr>
<tr>
<td><strong>Beam</strong></td>
<td>118 feet</td>
<td>105 feet</td>
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<tr>
<td><strong>Speed</strong></td>
<td>24 knots</td>
<td>24 knots</td>
</tr>
<tr>
<td><strong>Propulsion</strong></td>
<td>Diesel Electric Steam</td>
<td>Steam</td>
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<tr>
<td><strong>Turbine</strong></td>
<td></td>
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<tr>
<td><strong>Cargo</strong></td>
<td>550 trailers + 300 autos</td>
<td>385 trailers + 110 autos</td>
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<tr>
<td><strong>Internal Ramps</strong></td>
<td>12</td>
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New Vessel Service Features

• Diesel-Electric System Attributes
  – Better Able to Maintain Service Speeds in Heavy Weather
  – Smaller Engine Package Improves Payload Area
  – Ease of Maintenance

• Seakeeping Characteristics
  – Unusually Large Freeboard
  – Whaleback Forecastle to Shed Seas

• Enhanced Cargo Handling Systems
  – Multiple Internal Ramps
  – Broader Beam
  – Reduced Stanchions
  – Fewer Bulkheads

• Internal Fuel Tank
• Ice Bands
• Fresh Water Ballast
Seakeeping Tests

Ponce Vessel Seakeeping
Seakeeping Tests

Orca Vessel Seakeeping
Orca Class Vessel Redundancies

- 4 Main Engines
- 2 Auxiliary Generators
- 2 Electric Motors
- Dual Rudders
- Twin Propellers
- 3 Collision Avoidance Radars
The ship is fitted six generators and two propulsion motors.

- With all necessary auxiliary loads the following speeds can be achieved.
  1 Main Generator  12 knots  
  2 Main Generators  19.5 knots  
  3 Main Generators  22.5 knots  
  4 Main Generators  24.6 knots  
  4 + 2 Auxiliary  25.3 knots

- Even with one propulsion motor out of operation a speed 16 kts can be achieved on one shaft.
Speed Power Curve
Main and Auxiliary Generator Powering Steps

<table>
<thead>
<tr>
<th>Speed (Knots)</th>
<th>1 MAIN</th>
<th>2 MAINS</th>
<th>3 MAINS</th>
<th>4 MAINS</th>
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<tbody>
<tr>
<td>5</td>
<td>1 AUX.</td>
<td>2 AUX.</td>
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<td>10</td>
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<td>15</td>
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<tr>
<td>20</td>
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<td>25 - 30</td>
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Shaft Power (KW)

- **AUXILIARY**
- **MAIN**
F.O. Pollution from Grounding or Collision

Location of protected fuel oil tank for Alaska Service
Fuel Oil Tankage and Overflow Configuration

- F.O. Storage S
- F.O. Service Day Tank
- F.O. Settler
- Overflow
- F.O. Storage C
- F.O. Storage P

FR 86+12
LKG AFT
L.O. Pollution - Ponce Vessels

- Three seal sites are available for possible leakage.
- Oil piping is led down the outside of the struts to the oil bearings.
- This piping is susceptible to mechanical damage especially transiting Cook Inlet, in winter, in ice.
L.O. Pollution - Orca Vessels

- One seal site only is available.
- A new seal system is installed with redundancy and alternatives if one seal fails.
Ballast Systems and the Transfer of Non-Indigenous Species

This depicts the available ballast tankage.
By examining all operation conditions it was found that almost 90% of the operation could be covered using a combination of locked in, and movable, fresh water ballast.

This required slightly more ballast to be carried for some light conditions than would be necessary.
Human Resource Issues

- Diesel Electric vs. Steam Turbine E.R.
  - Licensing issues, experience issues, training, guarantee engineering
- Port/Shoreside Staff
  - Port engineers, maintenance personnel
- Reduced Crew Size
- Navigation Training Issues
  - Larger sail area, twin propeller, twin rudder, mooring/bulbous bow
Environmental Design Elements

- Double hull fuel tank protection
- Latest ballast management system
- Extremely fuel efficient diesel-electric power plan
- 4-Cycle engines - clean burning, low emissions of sulfur oxides and nitrogen oxides
- State-of-the-art sewage treatment plant
- Trash disposed shore-side via licensed contractor
- Awards: Washington State Recycling Association Recycler of the Year 2008; Tahoma Environmental Business Award - Tacoma-Pierce County Chamber – 2007; Washington State Governor’s Award for Pollution Prevention and Sustainable Practices – 2005; The U.S. Coast Guard Biennial William M. Benkert Foundation 2002 Environmental Excellence Bronze Award; States/British Columbia Oil Spill Task Force Legacy Award 2000; The Alaska Department of Environmental Conservation Commissioner’s Pollution Prevention Award 2000
Ice Strengthening

The new ships were designed to ice class I-C to mitigate potential hull damage.
Cargo Mix Flexibility

- “Stretch” Flatbed Loads + 70’
- 53’ Dry or Reefer
- 48’ “ “
- 45’ “ “
- 40’ “ “
- 30’ Pups
Orca Class: Inboard Profile